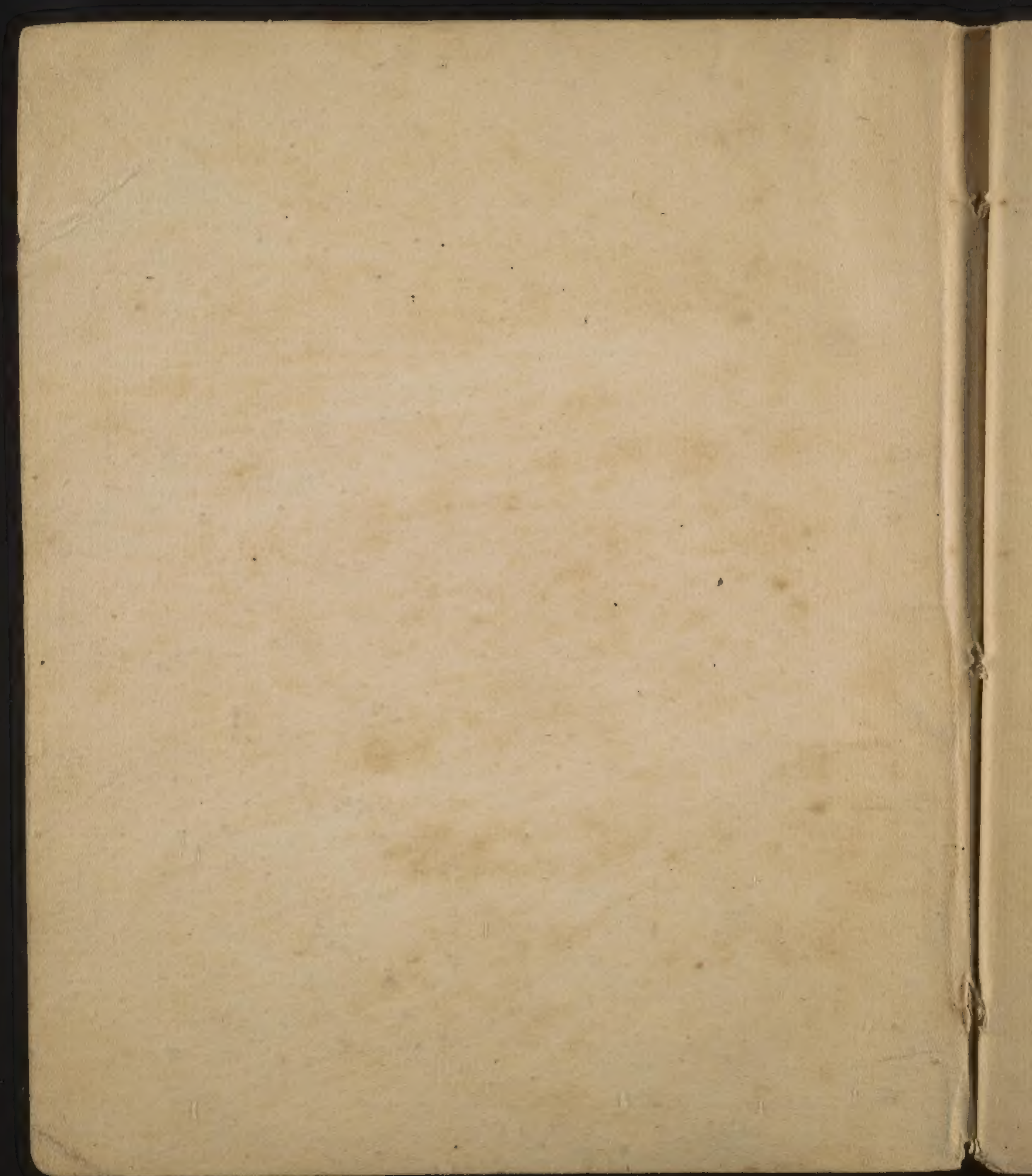


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F 15

15



of Digestion 621.
of the Chyle — 652.
of the blood —

V I shall first remark that the
Stomach is a most important viscus,
hence it is possessed by all animals.
It is so full of nerves that it may be com-
pared to a tremendous expansion of the brain. So
essential are its functions to life, that
it has said the soul is seated in it. It is
certainly the index of the state of the
system in many diseases. ~~It possesses~~
~~Stomach~~ ^{Association in health & sympathy in sickness} ~~connection~~ with
every part of the body: in health as
well as in sickness - The nerves - and
blood vessels may even the mind are
affected by it. - ^{It is one of the waste gates of sense ex-} hence it should never
^{- giving impressions.} be lost sight of in a moment in inquiry
in investigating, & prescribing for diseases
of those parts. Many diseases it is said
enter the body thro' the medium of the

such parts of the mouth as to favour
 the action of the teeth upon it. It after-
 -wards protrudes it into the fauces from
 whence it passes by the tonsils - Velum
 palati - & Epiglottis assisted by the action
 of a great number of small muscles
 into the Oesophagus - and from thence
 into the Stomach where it undergoes
 the process of digestion. ^{Solids} ~~Things~~ more easily
 swallowed than fluids.

Of Digestion.

~~Maxilla~~ In what manner is this
 performed? - The answer to this
 question shall be the business of
 our ^{inquiry.}
 the present ~~lecture~~ - V

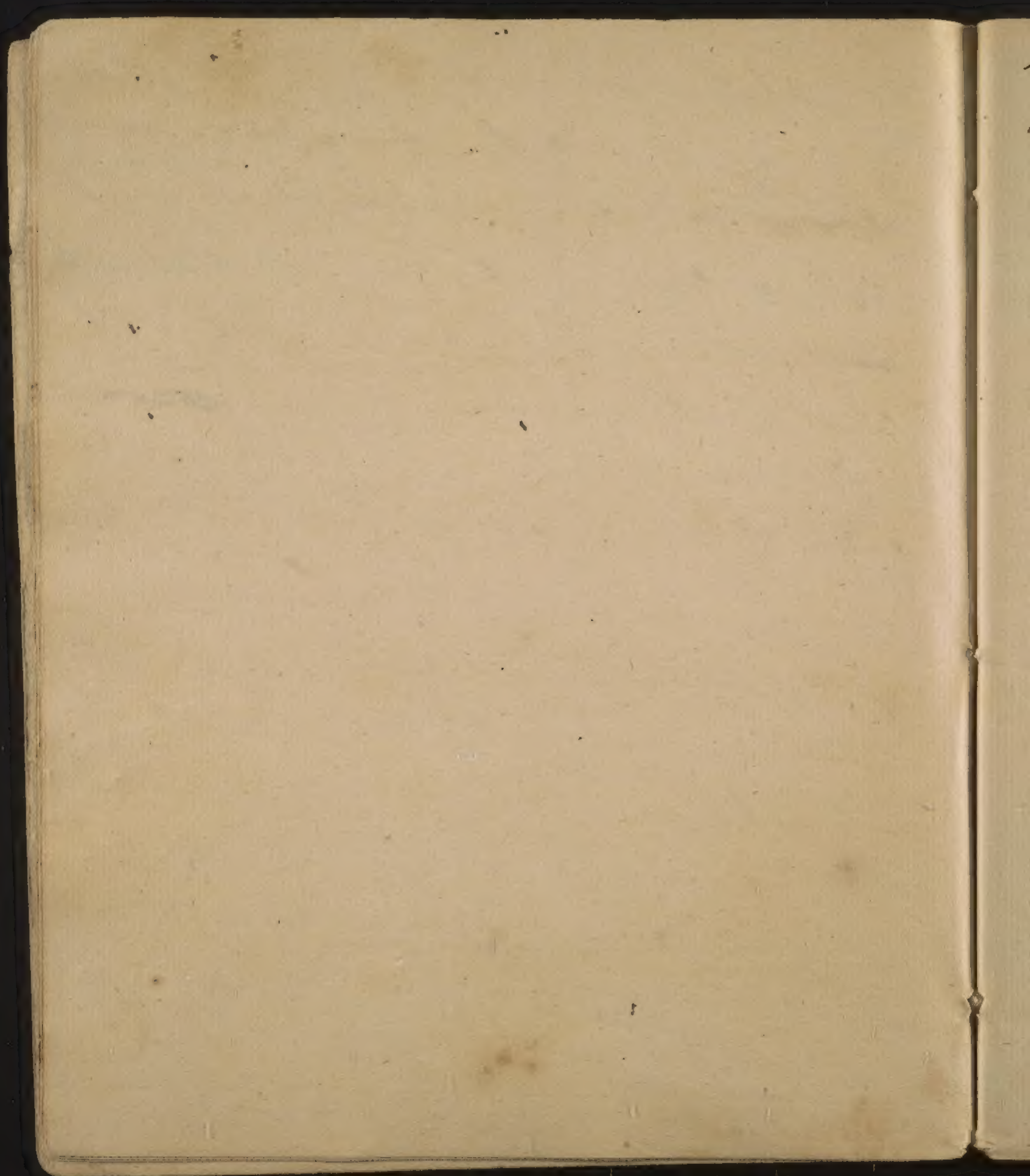
The changes which the food
 undergoes in the Stomach previously

Stomach — Still more I believe are
expelled from the body which act
primarily, & exclusively upon it. —
~~But to observe~~ —

It is formed ~~as~~ like the teeth upon the
compound principles of carnivorous
& granivorous animals.

Its function is an important one
in the animal Economy. ~~The~~ ^{We behold} ~~the~~
in ^{it} something like what the Alchemists
have sought for in their crucibles — in
their attempts to obtain Gold from the
baser metals — a power of changing the
most dissimilar & heterogeneous matters
into a ~~more~~ substance which imparts
nourishment & life to the human
body. —

to its living converted into Chyle, has
 been ascribed to the operation of two
~~agents~~ agents. These are 1 mechanical
 and 2 chemical. The mechanical
~~includes~~ trituration only. The
 chemical includes ^{putrefaction} - ~~heat~~ - ~~putrefaction~~
 - solution - and fermentation. Of
 each of which I shall treat in order.
 Much was ascribed to trituration
 by the mechanical physicians. Pit-
 -caiver has computed the force of the
^{employed in digestion} stomach to be equal to 12,957 pounds.
 Dr Boerhaave has enumerated all the
 forces which are ~~supposed~~ supposed to act in
 digestion - These are the muscular action
 of the stomach - the action of the
 Diaphragm in respiration - and



even

the constant pulsation of the Aorta ^{can}
 on the Stomach. ~~But nothing can~~
~~be said for~~ Dr Pitcairns's calculation
 of the force of the Stomach was not
 deemed to be contradicted, and the forces
~~of the~~ enumerated, ~~by~~ Dr Bouverne, ~~and~~
 will appear to be very trifling from
 the history of the following exp^t made
 by Spalanzani. He swallowed 25
 whole grapes - and discharged 18 of them
 in an
~~unbroken~~ unbroken state. He swallowed
 many whole cherries afterwards, most
 of which he discharged in the same
 sound state in which he took them.
 The triturating force of the stomach
 must be small indeed not to



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~~have~~ destroyed the texture of those tender
fruits. We proceed next to inquire into
the chemical Agents which have been
supposed to be employed in Digestion.

~~But~~ I reject putrefaction altogether
from having any agency in Digestion.
On the contrary - the putrefaction of
the Aliment unfits it so much for
being converted into Chyle - that when
Aliment which partakes of a putrid
Nature is received into the stomach, it
always excites by the action of the
gastric juice - upon it. —

The ~~only~~ ^{other} agents which are
concerned in Digestion, I suppose
to be, Heat & Solution. ~~It is to be mentioned~~
hereafter.

E. C. : of Adams

Spallanzani has determined this
by an accurate exp^t - he exposed a
cubed with some flesh to a heat =
to $\frac{1}{4}$ of $\frac{1}{4}$ human body - & the same
quantity to a heat of the common
air which was probably 20° degrees
below it. The first putrefied in 12 hours -
the last - in 2 or 3 days -

✓ Mr Hunter found that the digestion
of a frog which went on at ~~65~~ 60° was
effectually checked ~~at~~ when it fell
to 35° or 40°. ~~The digestion~~ It is from the influence
of heat ^{in part} that digestion goes forward
more rapidly in warm blooded, than
cold blooded animals. E.g. Dog. viper

Heat is essential to digestion. The polypus employs 2 or 3 days in winter in digesting that food which it digests in 12 hours in summer. ~~no solution~~ ~~no solution~~

~~no solution~~ can take place ^{the} without it. The gastric juice which is the principal solvent of the aliment in the stomach ~~discovered~~ ~~no more~~ dissolving power ~~at~~ in a heat of 44° or even 48° than common water. It is more active in a heat of 79° but its dissolving power is greatest at 112° . ✓

Heat is likewise essential to fermentation, and no degree is more favorable to an active and perfect fermentation than the heat of the human body. ✓

✓ The dissolving power of the saliva has 123
been established by ~~many~~ ^{many} experiments. 344

~~one~~ of it are needed in the course of ^{purpose}
24 hours. It serves the further ^{purpose} it is
supposed of Absorbing ~~oxygen~~ which
it conveys into the body. It has
neither taste, nor smell, and hence
~~it~~ it never impairs in its healthy
state either ~~the~~ of the powers of taste or
smell.

Solution is likewise essential to digestion. The humors which dissolve the food, are the Saliva, & the Gastric juice.

To decide the dispute between ~~Dr Haller~~ & ~~Dr Galvani~~, I am one

of whom asserts that it is ~~the~~ ~~other~~ ~~the~~ The Gastric Juice is the

most active of these humors. It was not the honor of Galvani to have discovered

that the Gastric Juice possessed a strong dissolving power over animal & vegetable

substances by his experiments.

The same doctrine was established by ^{before the time of Galvani}

Dr Haller ~~many~~ ~~years~~ years ~~ago~~. This gas-

trique acts more or less in all

animals, but more in some of



them than others. — These Animals
 which have gizzards stand in the least
 need of it — for they divide the food in
 such a powerful manner that it after-
 wards requires but little solution in
 the stomach. Its dissolving power is
 very great in the human stomach, hence
 we find cartilages — tendons & even
 bones are dissolved by it as well as
 common flesh. — It is probably more
 abundant and more active in children
 & in old people than in ~~the~~ middle
 age, in order to supply the defect of
 mastication from the want of teeth.
 I have said all
 It acts most speedily upon food that
 is well masticated, and upon flesh

V The presence of nervous influence is indispensably necessary to Digestion.

By cutting, or tying the 8th pair of nerves, Digestion was destroyed in a wolf & a dog, in so much that the contents of the stomach 24 hours afterwards become putrid soon afterwards.

which is perfectly done or well cooked.
 This has fully demonstrated by the exp^{ts}
 of D^r Sturms of St Louis in his thesis
 on digestion. —

This gastric juice has been said by
 J. Sturms to dissolve the stomach after
 death. It is possible this is sometimes the case
 death. — but I am disposed to ascribe
 what he calls a corrosion of the stomach
~~to~~ by this liquid ^{in some instances} to a destruction of
 substance from inflammation & mortification.

Such appearances are very common
 after death in all the bowels, where
 we are sure the gastric juice cannot
 exercise its corroding power. ✓

Spadanzani says he found diges-
 tion ^{to} go forward after death, but ⁱⁿ
 a very feeble degree after the heat

✓ notice of this bird.

In addition to these powers, in promoting
 digestion, the influence of the ~~system~~ whole
~~system~~ system is necessary for this ^{not only}
 purpose - hence we find it impaired
 by ^{depressing} passions of the mind, ~~and~~ but by all those
 accidents, and diseases, which divert
 the nervous influence from it. ~~In short~~ ^{short}
 It is exclusively an animal process as
 much so as the formation of blood serum,
 & never has it perhaps never can be
 initiated ~~out~~ out of the body. -
 go to p. 644. +

† I beg this fact to be remembered. Abstinence &
low diet, ^{are} founded on it. When we wish for the aid of
all the powers of life, in curing a disease, let us bles
give them nothing to do in digesting a quantity ^{large} of food, or
food difficult of digestion. Plur
grammar.

of the dead animal was dissipated. -

The gastric Juice yields by a chemical analysis a large proportion of the animal ammoniacal salt - in which is contained the phosphoric or animal acid. Take

~~The stomach~~ ^{the stomach} possesses a power of crushing milk, ~~this is evident by~~ ^{this is evident by} ~~that it is found in the stomach~~

of many young animals, particularly children, calves, turkeys & fowls. But

this power resides in ~~the~~ animal substance as the ~~same~~ ^{also} in the heart of a turkey. It ~~resides~~ ^{is also} in fish &

~~may even be found in the liver of the cat.~~ ~~I am not further facts~~

~~I find only the following~~

real pp 629-643

given 11-11-1772

~~The list list of the~~

~~found to reside in the~~

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juice, or that fermentation was in a degree promoted by it. —

The Aliment being thus prepared by solution, undergoes a third change in the Stomach by means of Fermentation. I know this process to be in Digestion to be rejected from the modern Systems of Physiology — I know too that there is as much a fashion in Opinions as there is in Drefs. I shall however still defend fermentation as one of the causes of digestion Just because I have like Gil Blas written a book upon it, but because I cannot account for all the phenomena of digestion without it. Such of you Gent: who know



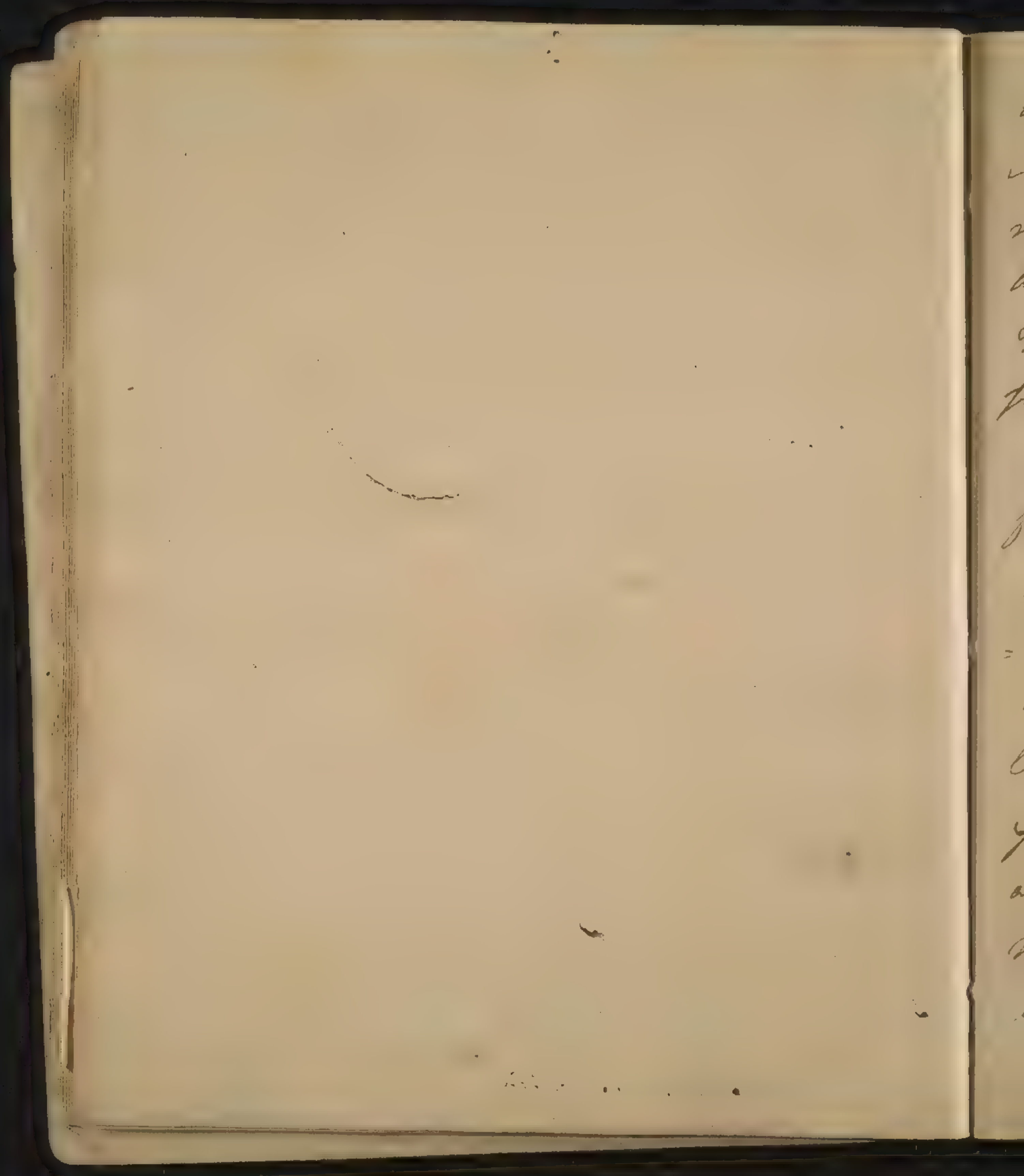
how many opinions ~~which~~ which
 I once believed and thought. I have reja-
 -cted in the course of the last ^{10 or 15} ~~20~~ years
 will not accuse me of obstinacy upon
 this subject. — My weakness in the
 republic of medicine is of a very ~~de-~~
 opposite nature. ~~I have accused of a~~ It consists in a dispo-
 sition to change ~~some of~~ ^{my} opinions. If this
~~disposition~~ ^{be} a disorder in my mind, I ~~do~~ hope
 no remedy will ever be discovered to
 remove it — for ~~as~~ I convince that ^{to be willing} for
 ever to unlearn, ~~instead of learning~~
~~is~~ ^{is} the ~~very~~ ^{most certain & effectual} way to come to a
 knowledge of the truth. —

[By fermentation I mean that
 natural process by which ~~heterogeneous~~ ^{heterogeneous}

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matters are rendered homogeneous, so that a new product is obtained, wholly different from the original mass from which it was formed. —

Animal & vegetable — & even fossil substances are all capable of fermentation. — It is specifically different in each of those classes of matter. ^{when} In vegetable matters, they undergo the ~~process~~ of fermentation, they pass ^a thro' three stages — viz the vinous or acetic & putrefactive state. It is uncertain whether animal matters pass thro' the vinous, — tho' some facts make it probable, — but it is certain that they undergo the acetic ~~state~~ and putrefactive states. Dr Haller observes no



that he had distinctly perceived an acid smell ^{of fermentation} in meat, and Dr Thomas Smith informed me that he distinctly perceived ^{taste} not only an acid smell but an acid ~~state~~ in a piece of beef which he had kept two days in summer. —

~~Four~~ ^{Four} circumstances are necessary to favour the fermentation I have described.

1 Heat from 72° to 112° are most favourable to it.

2 moisture: I fear tho' it affords the basis of fermentation in all vegetables, yet may be kept in a sound state for an 100 years provided it be kept free from moisture. — 3 Air.

4 Rest — This is necessary to render all the stages of fermentation regular. Motion ^{when immoderate} either prevents it altogether

o
co
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v
p
p
c

or hurried it over suddenly to the autolysis
or putrefactive stages.

The fermentation of all ^{substances} ~~substances~~ ^{matters} capable of it is quickened by certain ~~sub-~~
called ferments.

Let us now inquire how far these
principles apply to the digestion of our
food.

1 Our Aliment consists of such sub-
stances as undergo the various autolysis
& putrefactive stages of fermentation
out of the body. —

2 The heat of the Stomach is highly
favourable to the fermentation of
the Aliment when received into the
Stomach. (3) Our Aliment & Saliva are
both strongly impreg. wth Air.

4 The Aliment impreg. from Saliva.

and digestion is favoured by it.

v Dr Hammond of Cambridge proved the Advantages of rest after eating by the following experiment. He gave two pointers a hasty meal of flesh.

One rested - the other ran two hours after eating. In the former all the food was digested - in the other - it

was scarcely begun.

The state of the
Air influences Digestion. The inha.

^ - bilants of the ~~air~~ ^{ch} ~~circumstances~~ of Switzer.

= land digest the ~~greatest~~ ^{greatest} Aliments ~~which~~ ^{ch}
upon their mountains which ^{to}
~~are so viscid and gross that they can~~

- not digest them upon their plains.
return gas to / 5648 v

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- gastric juice - and the liquid, ~~mix~~ taken
with our meals, ~~sufficient~~ all that
degree of moisture which is amply suffi-
-cient to promote its fermentation.

3 Digestion is always best promoted by moderate motion, ^{exercise} when greater than the action of water, rest. - motion ^{increases} it if void increased.

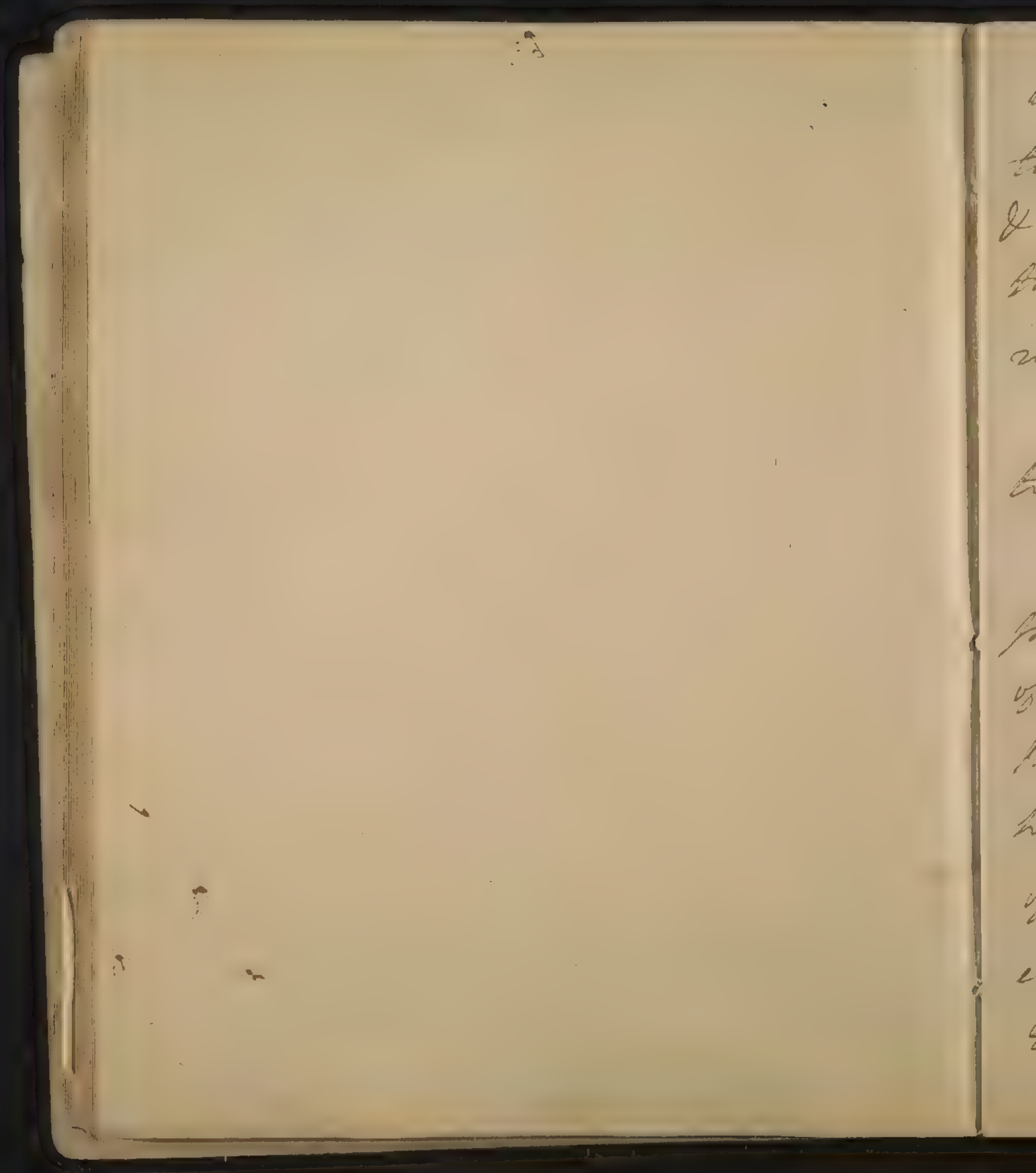
rest. - Then
After eating a hearty meal. - V

But it may be said that the capacity with which digestion is conducted in the stomach is too great for the slow process of fermentation - tho' favoured by all the circumstances which have been mentioned. I should say ~~concern~~ ^{concern} in this objection ~~does~~ ^{do} not ~~reside~~ ^{reside} two things which are calculated to accelerate it beyond its ordinary term of duration out of the body. These are 1st ¹² fts

Speedy & perfect solution in the stomach
 by means of the gastric juice - now,
 heterogeneous liquids, ferment much
 sooner than heterogeneous matters of a
 more solid nature. — Part 2nd The
 action of the saliva ^{acts} upon the food ~~from~~ ^{as}
~~under~~ a ferment and thus promotes
 its fermentation. That the saliva is
 a very essential ~~digestion~~ liquor
~~promotes fermentation~~ in the process
 of digestion I infer from the waste of it.
 1 from the quantity secreted 3x4 in a day 2nd
 being so generally attended with indigestion.
 — This is evident amongst farmers
 & chewers of tobacco — some years ago
 a certain sweet gum was used as a
 mastic by the nobility of Spain to
 perfume their breath. It ~~was~~ produced
 this effect, but it spread dyspepsia,



& Hypochondriasis among ^{the Saliva} them. But I go
 further, and add, that ~~it~~ acts as a fer-
 -ment upon the Aliment in promoting
 digestion. This I infer not only from
 the experiments of Distabl, Boerhaave,
 Hoffman - & Mr. Brides, - but from the
 following experiment made by my-
 -self. I took two parcels of Mutton
 & bread - consisting of 3ij each & put them
 into separate Vials. To One of them
 I added 3j of ^{healthy} Saliva - to the other half
 an Ounce of water. I then ^{exposed} placed each
 of them to the same degree of heat in
 a box of sand in which I ~~put~~ placed a
 thermometer so as to keep the heat
 as nearly as possible at the tempera-
 -ture of the human body. In five



hours the mixture with the saliva began to ferment, - in seven it became sour & in twelve it became putrid, - while the mixture with the simple water remained unchanged for 20 hours.

I repeated this experiment a 2nd time - and with exactly the same result.

Thus far Gent. have I mentioned ~~any~~ presumptive arguments only in favor of ^{fermentⁿ} ~~digestion~~ being essential to digestion.

But I shall not leave the controversy here. To decide it beyond all possibility

of contradiction, I tried the following experiments - not upon Man - Cow

Eggs - Dogs - Cows - Horses For even upon Dr. Storer's Superfolds, but

Ha

Contents 638

upon the ~~aliments~~ of my own stomach,
at a time when I enjoyed the most
perfect health.

Expⁿ 1

Having first taken a few grains of Salt of Z in
order to destroy any remains of an acid in my
~~Having dined upon Beef-bread & pease~~
Stomach after my last meal, I
~~I small meat-bread - three~~

dined upon Beef-bread - pease & small
beer. Three hours afterwards I took
two grains of Tart. Emet. & threw
up the contents of my stomach. They
were acid to the taste, & imparted a
red color to an infusion of a blue
flower.

Expⁿ 2

Having taken Salt of Z as before, I
dined on meat-bread & pease, & drank
water only with them. Three hours

Afterwards I vomited. The contents of my Stomach were sour, & produced the same red color upon being mixed with a blue vegetab^{le} infusion.

Exp^t 3.

Having dined on poultry - Cabbage - and unleavened bread, I took a Vomit ~~these~~ ^{at} the usual hour afterwards. The vomit was exactly the same as in the two preceding experiments

Exp^t 4.

Lest it should be inferred, that my Stomach ~~was~~ ^{was} ~~not~~ disordered - or possessed an acid dyscrasy - I prevailed upon one of the most healthy & ~~was~~ ^{was} ~~that~~ young Englishmen in the University of Edin^{burgh} Dr. Penny in the year 1767 to lend me

Handwritten text on the right margin of the adjacent page, including fragments such as "2", "L", "De", "C", "2", and "L".

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the aid of his stomach in pursuing any
inquiries into this subject. He dined
~~with me~~ on duck - beans - & drank
small table beer with them. Three hours
afterwards he vomited. The ~~was~~ ^{liquor} he
discharged was sour - & imparted a red
color to the blue vegetable infusion.

These experiments were ~~made~~ frequently
[&] repeated, ~~but~~ sometimes varied - but al-
ways with the same issue. —

I know that great pains have been
taken to discredit them by a report that
I was not in health when ^{I made} ~~took~~ them.
but this is begging the question. Mr.
Gosse a German Physician who
has lately written on digestion admits
my ^{being in health} ~~experiments~~, but ascribes the

[Faint handwritten text visible on the right edge of the page, including characters like 'A', 'L', and 'v']

acid liquor which I discharged to
 the ~~single~~ ^{single} ~~acid~~ ^{acid} of tartar Bimetic being separated
 from the Antimony in my stomach.
 - This ^{assertion} ~~is~~ ^{is} too absurd to be contradic-
 -ted. —

I concur with Spalanzani in all
 he says in favor of the wonderful dissol-
 -ving power of the Gastric Juice - But
 solution ^{alone} will not ~~exchange~~ the nature
 of Aliment, or produce any new com-
 -pound, - much less will can it produce
 the same liquor from all the different
 kinds of Aliment which are taken in
 the stomach. Is there a menstruum
 in Chemistry, - that produces exactly
 the same compound when mixed
 with every different metals - ^{salts -} ~~carth~~?

I ask the question again - is there
 any analogy to the gastric juice in
 all nature - if we allow it to possess ^{not} ~~but~~
 only a dissolving - but an assimilating
 power - over the most heterogeneous
 substances with which it is obliged to
 unite in the stomach? ^{however there is not.} -
 I beg pardon
 first for this challenge - I now rec-
 -lect one - and but one analogy to it -
 It is found, not in the book of Nature,
 but in ancient fable - it is the staff
 of Aesculap which turned every thing
 it touched
 into gold - And it differed only in power
 - forming this change more suddenly,
 than the gastric juice converts our
 aliment into Chyle. -

I think it probable that the

✓ I conceive this Aid to be formed
necessarily, and to serve very im-
portant purposes in the animal
economy. —

In explaining
+ ~~proceeding~~ particular functions
it is necessary to keep any eye upon all
principles th go for ~~whole~~ in every part of the body,
~~the functions of the body~~ — otherwise we
shall make as great mistakes as Physi-
-ologists, as those Physicians make who
prescribe for Symptoms only in a disease
without regarding the state of the whole system.

Digestion in a healthy State always
 ceases as soon as an acid is evolved
 from the Aliment. ^{The} ~~This~~ acid ^{which} ~~leaves~~
 we find in the Animal Salt, and
 afterwards becomes a basis of phos-
 phorus - ~~the acid~~ ^{appears to be formed} from it.
~~It is the~~ ^{Absence of this acid} ~~probably~~
 which produces the fermy, & its ferro-
 minance which forms the nucleus
 of the stone. It exists in a material
 only - and not in a formal state
 after it leaves the stomach, for it is
^{covered} ~~covered~~ after it is changed into Chyle
 so as to not to be ^{discovered} ~~perceptible~~ by
 the common tests of acids. ^{It}

Thus have I delivered my opinion
 upon the subject of digestion - nor shall
 I yield it to Spalanzani - Stevens -

V In ~~more~~ detailing the facts & exp^{ts} in
favor of fermentation taking place in
the stomach, I have not availed myself
of the least aid, from the air & acid humor
which are often discharged from the
stomach in digestion: for I consider them
when ~~as~~ morbid phenomena, to be
explained ~~rather~~ after, ~~when they~~ depending
upon a relaxation of the stomach, and
an excess in the fermentative process.

on Goffe ~~but~~ untill they have taken
 as many probes as I have done, to
 establish the hypothesis they have
 given to the world. ~~7~~

✓ There is but one ~~exp^t~~ wanting
 to ~~establish~~ ^{consider} ~~the~~ my theory - & i.e. to ex-
 -amine ~~by distillation~~ whether the con-
 -tents of the stomach will yield by distil-
 -lation a vinous spirit. — If they should,
 it would place fermentation in the
 stomach as ^{one of} the causes of digestion be-
 -yond all possibility of being doubted]

I shall now add a few observations
 upon the phenomena which go for-
 -ward in digestion. —

1 There is after every full meal
 a slight fever. It is sometimes ushered

Dr Prout's exp^t which
 under examination^{re} highly
 probable. He died in 1802
 with yellow fever before
 he had completed his
 exp^t.

A Dog was killed his body opened and a thread tied round the Duodenum just below the pylorus, the duodenum and Aesophagus were then cut off & the stomach immediately taken out & nearly all the gastric juice poured out, it was then filled with Dough made of wheat flour & water & covered over in warm sand, in which Fahrenheit's Thermometer stood at 96° with the divided end of the Aesophagus just above the surface of the sand, in this situation any change which might take place in the Dough would be easily observed, a piece of Dough was moistened with water & covered in the sand by the side of the stomach, by way of comparison - in two hours & three quarters a very active fermentation was observed in the stomach - the Dough worked up & ran out of the Aesophagus - no change in the Dough in the sand

Experiment 2

A Cat was next killed & the stomach taken out as quick as possible to prevent it from cooking. The thread & other precautions to save the gastric juice was neglected & the stomach immediately covered in the sand & a lump of Dough about the size of a walnut put in the stomach & the same quantity put in a vial containing a small quantity of water. in one hour & twenty minutes there was a considerable motion in the stomach & the Dough worked up three fourths of an inch above the end of the Aesophagus - no change in the Dough in the phial -

Experiment 3

Another Cat was killed & the stomach taken out this stomach contained a large quantity of bile soon full of the gastric juice about two thirds of which was poured out into a phial. equal parts of Dough was put into the stomach & phial. the phial was used by way of comparison. in one hour & twenty ^{five} minutes the Dough in the stomach shew signs of fermentation the working increased & in 4 hours the fermentation was so considerable as to force $2\frac{1}{3}$ of the Dough out of the stomach - it was compared by a bystander to the working of a barrel of Cyder - the motion continued untill 6 hours at which time the sand was suffered to cool - not the least signs of change or motion appeared in the Dough in the phial



in with a slight degree of chillings,
 and in weakly people it is often termi-
 -nated with a gentle sweat. This fever
 is occasioned by the stimulus of ~~food~~^{the}
 meal being overproportioned to the
 excitability of the system produced by
 hunger. — It is not necessarily con-
 -nected with eating — nor is it prece-
 -ded after a slender meal. The know-
 -ledge of however of the existence of this
 fever may be applied to several useful
 purposes. — It should lead us to recom-
 -mend a plentiful meal to all persons
 who are about to be exposed to the
 cold in ~~a situation in~~^{a situation in} ~~which they~~
 cannot use ^{much} exercise ~~in a small~~

✓ For the time is not yet come when
philosophy can afford either war, or
government. H

pamphlet which I published during
 my attendance on the military hospitals
 was entitled "Directions for the preserving
 the health of soldiers" I recommended
 in strong terms that a soldier
 should never do the duty of a Centinel
 in cold weather, but after a hearty
 meal. But I am sorry to say that this advice
~~was not followed, and was never agreed to~~
 2 There is frequently a disposition to

sleep after a full meal. This is owing
 to the stimulus of the food producing
 dyspnoea in the brain ^{fulnes &} coma, or ^{the} the
~~is a condition~~ tending to the ~~loss of~~
~~healthy life~~ ^{the} It is most commonly removed

by the additional stimulus of ~~food~~
 tobacco in the form of snuff, or
 cigars - or by a few glasses of wine.

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This sleepiness is not necessarily connected with eating. It never ensued a moderate meal. Lewis Cornaro tells us that after he adopted ~~his~~ ^{the} new & temperate mode of living ^{wh} ~~it~~ restored his health, & prolonged his life to the most extreme old age, he found no disposition to sleep after eating.

3 The mental faculties are generally affected by a full meal. But this likewise does not follow a temperate repast. Lewis Cornaro used to ~~exchange~~ ^{exchange} his ~~table~~ ^{knives & fork} for a book, or his pen & ink, & never found any inconvenience from it after he began to live a life conformable

6
V. The food generally lies from 1 to 7 hours
in the stomach according as it is more or less
~~easy~~ easy of digestion. Its ^{time is from 3 to} ~~medium~~ ^{fine}
~~as it is~~ ^{as it is} ~~digestible~~ ^{digestible}.
hours ~~shall~~ ^{shall} hereafter mention
instances of ~~being~~ ^{being} substances lying
days - weeks - months & even years in the
stomach without being digested. p. 649 =)

to reason & nature. —

4 There is generally a disposition to ~~rest~~ ~~after~~ ~~a~~ ~~plentiful~~ ~~meal~~, ~~and~~ ~~soon~~ ~~rest~~ after a plentiful meal, ~~and~~ ~~soon~~ ~~rest~~

Dr Hammond of Cambridge proved the ^{in favoring digestion} advantages of rest by the following experiment. He gave two pointers a hearty meal of flesh. One rested; the other ran two hours after eating. He then killed them both. In the former all the food was digested; in the latter it was scarcely begun.

5 The state of the Air influences digestion. The inhabitants of Switzerland digest aliments upon their mountains which they cannot digest in their valleys, nor upon their plains. ^V
~~may or never present for a chronic~~



disease, without enjoying my patient
 to make six or seven small meals,
 instead of two or three large ones in
 a day. There are many instances
 of apoplexies & palsies following full
 meals in persons of delicate health
 and some of sudden death from the
 same causes I have said

=17 The passions have a great influence
 upon the digestion of the food. It is invi-
 =gorated by cheerfulness & joy - hence we feel
 least inconvenience from full meals
 which are followed by cheerful con-
 =versation. ~~The passions have a great influence~~

It is retarded by grief - fear - and
 shame - the passions seem to act
 only upon the muscular fibres of

✓ Is there a preternatural affinity
of the Electric fluid of the nerves
to the stomach which accelerates
the fermentative process, & thus im-
pairs the digestion? It seems probable
from an exp^t related by Dr Johnson.
If the 8th pair of nerves which goes to
the stomach be divided, digestion is
immediately interrupted, & the food
putrifies on the nature of gases in the
stomach.

✓ you found if you will preserve a
yeast. I have ~~observed~~ rejected fermentⁿ
from being one of the causes of the

of the Stomach. In the former case the Stomach is assisted in propelling the Aliment After it is digested into the Pylorus; - in this ^{latter} case, the debility of the Stomach induced by the relaxing passions prevents its acting with its usual force in throwing the food out of the Stomach.

The Aliment ~~after~~ ^{when} it is digested is called Chyme. After it passes into the Duodenum it is mixed with the bile. The cystic bile is said to ~~precipitate~~ ^{precipitate} its fecal parts from it, and impart to them its peculiar color. It is now called Chyle.

I have thus mentioned the means by which Chyle is formed by the Stomach, but it requires the aid of another viscus to render it fit for

V off. certain experiments on matters
I agree to the ^{first of these} opinions

from the blood. ~~I have said~~
I shall only say the nature and in answer to
the query is not of acid ~~but of base~~
the second, I shall now lay before you
~~and see what~~
some facts intended to prove that the liver serves a
much higher purpose than to discharge ~~waste~~

~~any~~ any thing of a focal nature
from the blood. go to account of the
liver p: 16.

composing perfect animal nourish-
ment. This viscus I believe to be the
Liver. The common opinion of the
Office of this large & noble viscus is
that it is intended ~~for~~ to furnish
a fluid which by mixing with the
~~food~~ Chyme that descends from the
Stomach forms the Chyle. The Chyme
was supposed to be of an acid na-
-ture, and this acidity was said to
be destroyed by the bitterness of the bile.
This opinion was founded upon some
experiments made by D Ramsay of
Edin² and was taught by D Cullen.
2 The Liver was supposed by some
Physiologists to be a large excretory
viscus intended to separate & throw



Of the Lymphatics or Absorbing System.

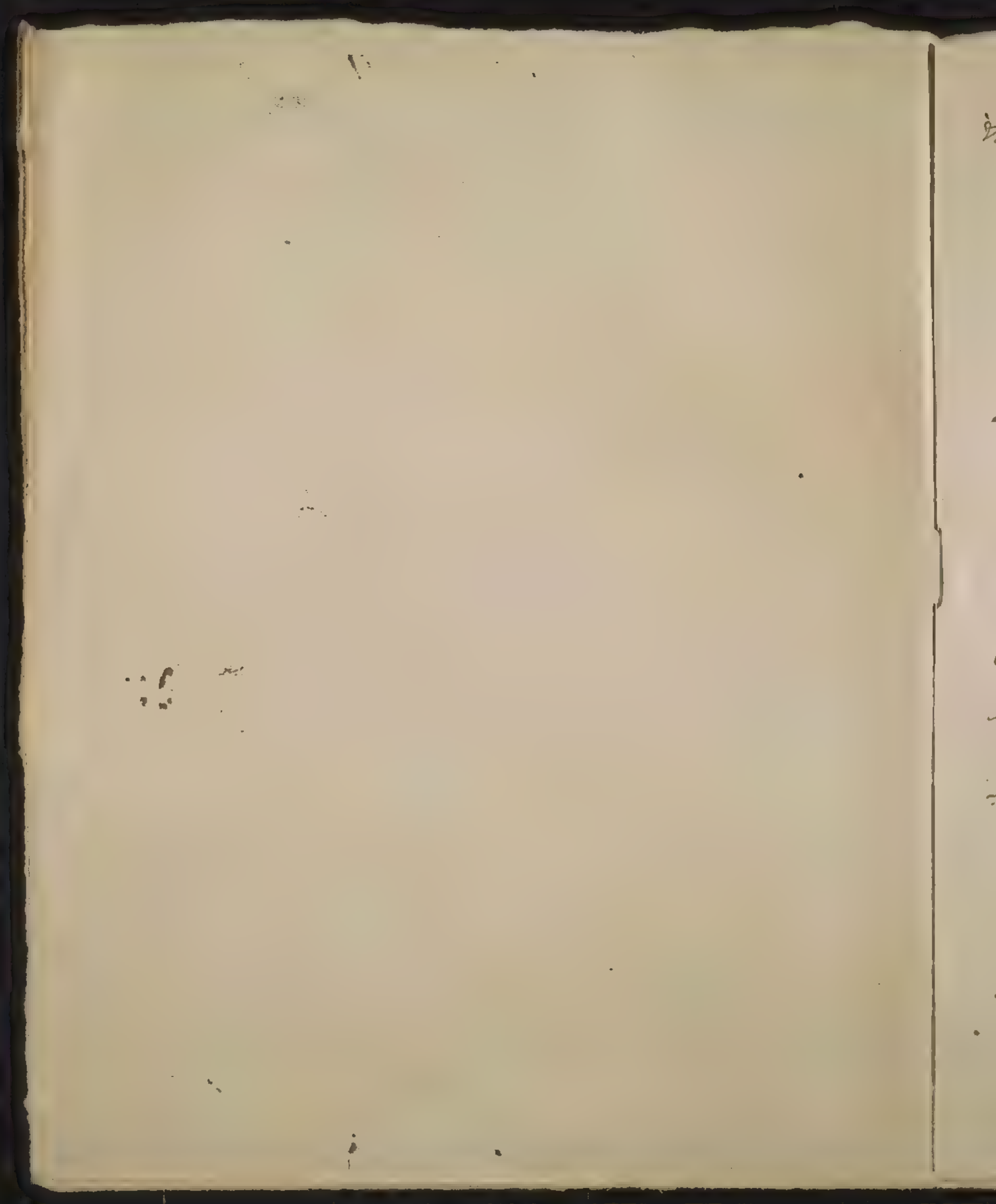
Upon this Subject you are not to expect a minute detail of all the Opinions & controversies which ~~have been~~ are to be found in books. ~~Such a detail would be~~ ^{Such a detail would be} as useless, as it would be tedious. I shall select only such facts ~~as appear to be true~~ as appear to be true, and deduce ~~from them~~ principles only, as ~~we~~ admit of being applied to pathology & the practice of Physic. —

By the Absorbing System is meant the Lactial as well as Lymphatic vessels. They are alike in so many particulars ^{that} they have been designated by one name. They both open into cavities of the body — they have the same structure. ^{in both} they ~~also~~ ^{pass} this ~~into~~ glands in some cases,

We return to pursue the Chyle which when
 formed by the stomach and liver ~~is~~ ^{in the manner that has}
 been described is conveyed
~~by~~ ^{through} certain vessels distributed plentifully
~~through~~ ^{through} the small, and sparingly thro
 the large guts called Lacteals from the
 milky color of the Chyle ~~by~~ which
 pass through them. These Lacteals
 have been supposed to perform the office
 of Absorbents by some Physiologists, while
 others suppose they perform the office of se-
 cretory vessels, and that ^{they induce} ~~they induce~~ by their
 action a change upon the Chyle analogous
 to that which a gland imparts to the



fluids which enter into them. The Chyle
 whether admitted into the Lactals by ab-
 sorption or secretion is conveyed by them
~~the~~ ^{the} ~~into~~ ^{the} ~~veins~~ ^{lymphatic} into a large Canal called
 the Thoracic Duct which runs along the
 vertebral, and is poured from it into the left
 subclavian Vein in which it is mixed
 with the blood, and conveyed to the heart.
 By what process it acquires all the properties
 of blood ~~is not~~ remains yet to be
 explained. Dr Whistler has thrown some
 light upon this mysterious subject in his
 ingenious inaugural dissertation. He has
 discovered by many experiments that the
 Chyle is coagulable in the thoracic duct,
 and after it enters the Arteries, but that



3

it parts off its coagulating ~~power~~ ^{quality in} the
 veins. From this you see it appears
 one of the properties of the blood in the
 thoracic duct, and in the Arteries; but it
~~is~~ ^{is} deficient in others. It showed
 ——— marks of what is called
 ——— Vitality, or ~~what~~ ^{what} I have
 called Animation of the Crapule
 lymph of the blood, when subjected to gal-
 vanic influence. The Doctor supposes
 further, that the blood like the bones
 and muscles possesses a power of cover-
 -ing the matters which are brought
 into contact with it into its own
texture, and hence he says the Cause of



Sanctification.

The force when precipitated from the
 Chyle pass slowly into the lungs & into
 These are capacious, in order to
 prevent the ~~impurity of~~
~~disorder~~ insomniac of our frequently
 discharging them. In old age they
 stagnate for many days without
 much injury to the system. On the
 contrary, they probably perform the
 offices of those Stimuli which have
^{to} used act, or have become feeble in
 old people, and thus help to keep up
 the actions and machinery of life.
 The Stagnation of the force in ~~the~~

✓ The Intestines of Carnivorous
animals are much shorter in
proportion to the length of their bodies
than in granivorous ~~or~~ ~~animals.~~

~~and for obvious reasons. Vegetables~~

~~afford their nourishment more slowly~~

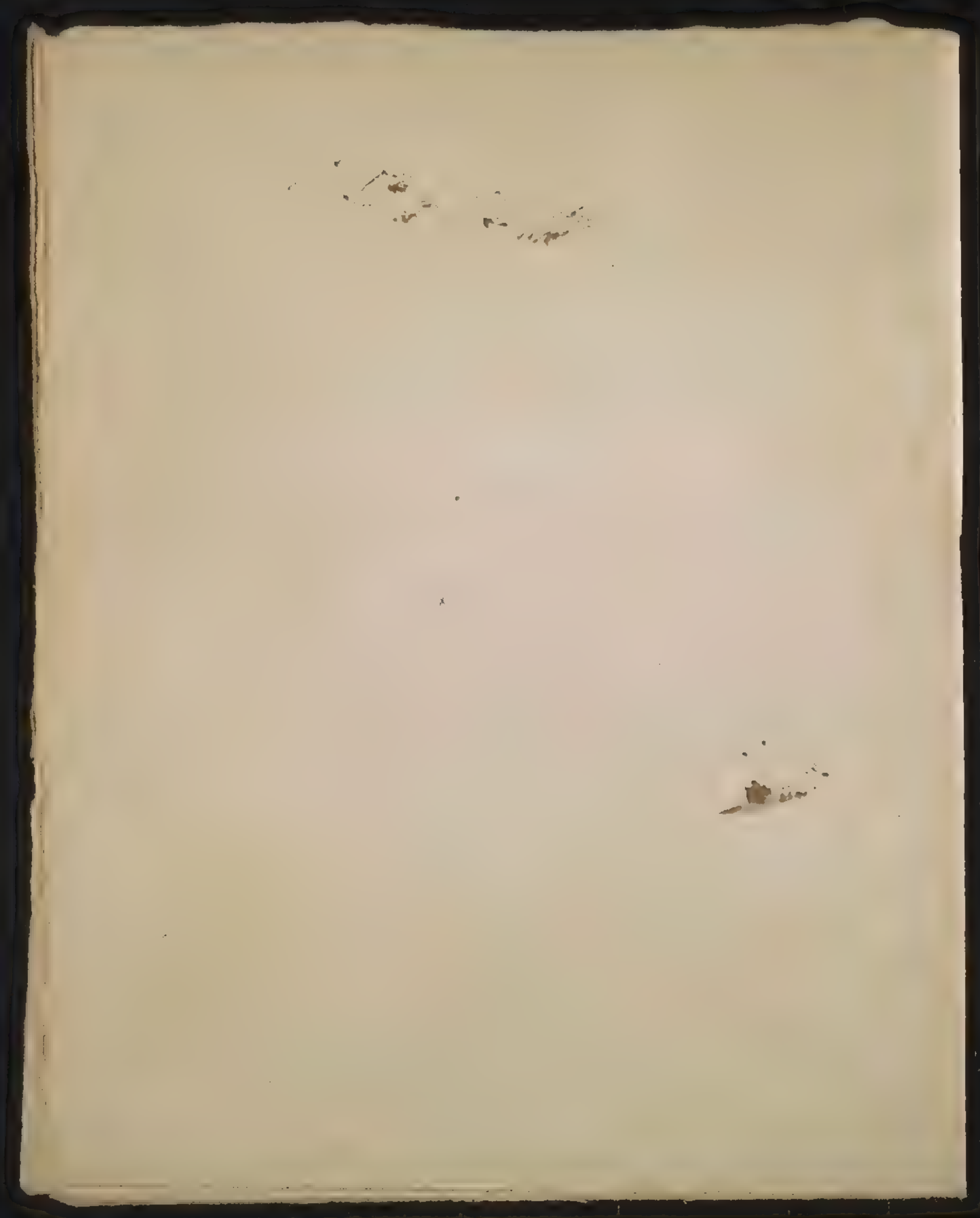
~~and~~ ^{and} for obvious reasons. Vegetables
afford their nourishment more slowly
& ~~with~~ with more difficulty than
animal matters, hence they require
more mastication - longer digestion from
one or more stomachs & a longer
course of lactals to absorb the chyle
formed by vegetable food.

5 seems to be
the bowels of old people ~~is probably~~ in the
Colon, and hence the reason probably
why the wind discharged by them is
less offensive than in persons in
whom the feces are constantly lodged in
the Rectum. ✓

We proceed next in order to speak
of that fluid which is formed from
the Chyle, and that is Blood. . . .
~~40 to p. 559 - 1~~







10
 seldom offensive, as it is in childhood & middle
 life. We should proceed next in order to

you will perceive that I have taken
no notice of the office of the Liver. It

trunk of the ^{blood} lymphatics, but before we take
leave of the contents of the functions of the
viscera, there remains one, upon the

use of which Physiologists have been divided
or silent since the ~~question~~ birth of our science.
I shall mean the Spleen. I shall attempt to explain
its use by delivering ~~some~~ a few remarks upon it. ~~Some~~
V. Some of the Lymphatics do not
it, has been supposed prior

to this contents into the Thoracic Duct. ~~but~~
Dr Brown has believed that this is the case
enter the blood vessels in other places. ~~This~~
proving the following experiment.
~~has been proved by Dr Brown to be a simple~~

exp^t. - he ~~cut~~ up the Thoracic Duct in several
various animals, and put them up with madder
ch^l he found tinged their bones. It has been
Several other facts ~~have been~~ ^{opinion} ~~fact~~ related by
further established by an experiment

Mr Richardson ~~also~~ applied a small quantity
of Iodine to the ^{throat} of a young man.
Soon afterwards he observed the salivary
glands ~~and~~ One half the ~~glands~~ ^{tongue} on

both have
 & pass by them in others & they ~~are~~ ^{chiefly} fluids
 valves. They differ in conveying ~~of~~
 of a different quality to the thoracic duct.

① Having ~~mentioned~~ ^{uses of} the lacteals formerly,
 it remains only to speak of the lymphatics
~~which are situated in the thoracic duct & its branches~~
~~which are situated in the thoracic duct & its branches~~
~~which are situated in the thoracic duct & its branches~~
 They are a system of
 small vessels originating ~~from the~~
~~in the~~ ^{all the} cavities of the
 after frequently anastomosing, - enlarging
 and, which ~~pass through~~ ^{contracting}
 thro' a series of glands called Conglobate
 & then
 discharge their contents into the ~~duct~~
 thoracic duct, which empty them into
 the ~~system~~ mass of blood in the manner
 formerly mentioned.

The following circumstances deserve
 attention with respect to these vessels.

1 They appear to possess coats analogous

left side to be affected by it. The right side of
the stomach & tongue were wholly unaffected
by the ~~fact~~ These facts are important, as they
show that certain medicines may be introduced &
moreover

✓ The fibres of these coats possess great
irritability, - inasmuch that according
to Dr Haller ~~as~~ they disappear altogether
when they are stimulated, ~~as~~ even tho'
they be filled with their natural, or wth
any artificial liquor.

+ into the system without mixing wth
the blood, or entering the great circulation.
~~The~~ It is thro' the lymphatics only that
liquids pass to the kidneys from the stomach,
and hence the ^{rapidity} of their passage. A
direct communication is not necessary
for that purpose.

† In the course of this year 1808 I attended
a young Gent^l who had laboured himself
for the disease. The ~~General~~ Spitting &c

to the coats of the blood vessels, One of which is ^{evidently} ~~is said to be~~ muscular. This appears 1st from their alternate dilatation & contraction, and 2^{ly} from their being liable to pain -

& swelling & inflammation. These coats are much stronger in proportion to their size than the coats of the blood vessels. V

2 They are all endowed with valves placed in some cases at a small, in others at a large distance from each other, which prevent the reflux of the lymph, in the same manner ^{that} the Valves in the Veins prevent the reflux of the blood.

3 They are all endowed, not only with veins, but with Arteries & Vessels in which the circulation is carried on with the same regularity in the largest vessels of the body.

It has ^{the mouth of} ~~been the analogy of the~~ ^{with certain} ~~arteries~~ ^{been supposed that they} ^{are} all endowed with

© Sores were on one side of his mouth only - and
the sores were healed on ~~one~~ that side only of
his penis by the application of $\frac{1}{2}$ to them. #
+ matters until they have ~~first~~ been absorbed
by a liquor ~~first~~ secreted by the arteries.

In Dec^r 1811 I attended a gentleman from
New Jersey, Judge Bergen in a palsy, ^{who} had been
salivated by his physician, ^{and in 1810} the $\frac{1}{2}$ affected the
lymphatic side of his mouth only. I shall ~~con-~~
~~-demur~~ ^{presently} to give a different ~~explanⁿ~~
of these facts in our pathology. — A

V6 They are said to possess a retrograde power
— by which means their contents are
propelled in a contrary direction to that
which is natural. ~~was rejected~~ Dr. Darwin
has furnished many facts in favor
of this ^{retrograde} motion in these vessels. & his father
has explained many of the phenomena
of diseases from it. see this work.

~~They possess~~ Mr. Richardson has lately
mentioned a fact which shows that the
lymphatics ~~as~~ convey matters to remote
parts of the body, ~~without~~ without

an opening which has been called a
mouth with which they not only absorb
liquids, but feed as it were upon solid
matters - such as ~~for~~ blood - flesh, &
even bone. What makes it ^{still more} probable
that they possess ^{something like} mouths, is that they have
been demonstrated in several fish ~~Dr~~
Moussu supposes the lymphatics do not ~~absorb~~ ^{drain} these
5 The lymphatic glands appear from
filling them with $\frac{1}{2}$ to be cellular, but
Dr Moussu has demonstrated that they are
~~composed~~ ^{composed} of convoluted vessels. Mr. Hewson
however thinks he discovered, a cellular
structure in some of the smallest glands.
It is certain that the blood vessels - nerves
& the small cells of the smallest glands are
connected together by cellular membrane.

Having delivered these general Observations,
we proceed next to enquire in
what manner the lymph which is carried

A Upon Dr. Hovius's exp^t of the facts I have related I shall
~~In the mean while I shall only remark~~ ^{colours matter of the}
 that ~~Dr. Hovius~~ I believe that the ^{colours matter of the} madder ^{penetrated}
 thro the solids of the body, and 2 matter of the
 stomach as it does of the ~~in~~ in Dr. Hovius's
 exp^t and thus found its way into the general
 circulation by which it was conveyed to the
 bones. The same thing probably took place in
 the exp^t of Mr. Hovius upon a rabbit in
 which he tied up the ^{just before it entered at} thoracic duct, at the
 junction between the left left jugular
 & subclavian Veins, and after waiting some
 injected ʒi of strong Infusion of Rhubarb,
 in 3/4 of an hour, the Urine was voided,
 & the presence of Rhubarb detected ^{pro} in it
 by the addition of potash to it. It passed
 into the gall bladder in Mr. Hovius's 2^d
~~the~~ ~~off~~ ~~out~~ ~~out~~ experiment in a dog in the same way.
 That the effect nothing can be

imposed in favor of Dr. Munnich's opinion
from & affecting but ~~not~~ the Lymphatic

~~the comes the~~ my dear ancestor informing
Glands of the Kid only. I hope in our ^{part}
- history to give a more satisfactory ^{explanation}
of these facts. I will only remark further,
~~you notice that I send to you a copy of the~~ fore-

that I do not think that we require a passage
from the stomach to the kidneys to account
from the ^{sudden} rapid increase of Urine after the
Stomach has been ^{and} overcharged with
watery liquors. It may be explained ^{in this}
upon another principle to be mentioned
hereafter.

the intervention of the Rosacic duct. By
applying Gal. ointment to the ^{left} leg, ~~as in~~ ^{of the} ~~glands~~
young man, he affected the ~~salivary~~ ^{glands}
of the left side only, and one half the
left side of the ~~tongue~~ ^{of the} with those Apthous ^{sores}
which attend a salivation - the right
side was wholly unaffected with the ~~G.~~

by these ~~veins~~ ^{veins} to the heart is found
 in the different cavities of the body. Formerly
 it was supposed to be an exudation
 from the extremities of the Arteries,
 but Mr. Huxson has made it probable
 that it is a secreted liquor. This he endeavours
 to establish 1. by proving that the
 Lymph is of a coagulable nature, &
 that it partakes of most of the properties
 of the coagulable ^{ling} Lymph of the blood. This
 coagulable quality belongs equally to the
 fluid which is found in the ~~arteries~~ ^{lymph. vessels}
 with that which is found in the cavities
 of the body. 2 He infers it from the
 diseases to which this fluid is liable,
 all which he ascribes to the disordered
 state of the ~~arteries~~ ^{veins} which secrete it. & 3. In a Dropsy the



Lymph is less coagulable than in health.
 This he ascribes to a relaxation in the
 secretory vessels. ~~And~~ Again. we sometimes
 find ^{certain internal} ~~the~~ surface of as the pleura - Pericard:
 - Diaphragm & even the ^{inside} ~~interior~~ of the
 heart covered with a crust which resembles
 the rise or buffy coat of the blood. This
 Dr. Benson supposes to be produced by
 too much tone or action in the ^{vessels} ~~arteries~~
 which secrete the lymph - & lastly - he
 supposes this to be nothing but the product
 of a certain degree of inflammation
 in these vessels. - This opinion ^{concerning} ~~concerning~~
 - this was first suggested by Dr.
 Morgan, and it is now I find ~~many~~
~~many~~ adopted by physiological writers.

In what manner is the lymph
 when secreted taken up by the lymphatics?



It has commonly been supposed by means of capillary attraction - hence their name of Absorbents - but I would rather suppose that it is by the effect of muscular contraction excited by the specific stimulus ^{or matter taken up} of the lymph upon the mouths of the Lymphatics. —

In what manner is the lymph when it enters the Lymphatics conveyed to the ~~and throughout the body?~~ ^{thoracic duct?} I answer - 1 by the pulsation of adjoining Arteries - 2 by the pressure of contiguous muscles - and 3 by the stimulus of the Lymph acting specifically & mechanically upon the Lymphatic vessels in every part of their course.

Are Lymphatic vessels found in every part of the body? I answer in every part except the head, and these

✓ 3^{ly} From the cures which have been
made of the Hydrocephalus internus,
which dissections prove to arise from
an effusion of water in the Ventricles
of the brain. —

661 from the following cir-

cumstances there is presumed, from the

analogy in certain fishes & particularly

the Salmon in whose head Dr. Monro dis-

-covered them many years ago 2^d From

the history of a ~~case of~~ disease related by Mr. Henson.

~~He~~ A man was affected with a right

palsy of his left arm - ~~and~~ ^{with} a hesitation

in ~~his~~ voice & a trembling of his lips. These

symptoms were supposed to arise from

some compression in the brain. A swelling

in a lymphatic gland in the left

side of the neck which finally suppurated,

~~the~~ removed all his complaints. Probably

by the translation of ^{an effusion from} ~~an internal~~

an internal ^{or cephalic} to an external gland,

It is presumed from the ~~certainty~~

that the veins in no part of the body



absorb lymph. This has been proved
by many experiments made by Monro
& Hunter.

I have said that the lymphatics ab-
sorb solid as well as fluid bodies. This is
evident from many facts. The ~~destruction~~ destruc-
tion or annihilation of the Thyroid
gland can be accounted for in no other
way. The greater levity of the bones of old
than ^{of} young even; - the absorption of the
color imparted to the bones by madder; -
the portion natural softness of the bones
in certain diseases; - & the detection of
bony matter in the Urine, all prove
that the lymphatics possess a power over
solid matters. - To these we may add the
occasional disappearance of schirous

✓ It would seem from this fact, that
the Arteries & Lymphatics perform
opposite offices in the System. The
business of the one, is to repair - of the
Other to destroy different parts of the ~~system~~ ^{body} -
- of the one to secrete ~~of~~ ^{& usual} a fluid,
& of the Other to absorb it & mix it again
with the blood from which it was secreted.
Health ^{seems to} consist in this strife between the
Sanguiferous & Lymphatic Systems, and
no longer ~~as they are separated~~ ^{does an artificial tape}
~~place between them~~ - than we
behold ~~as~~ Dropsy - Diabetes - Rickets - and
Scrophula - of ^{the} more hereafter.

trunks & veins in every part of the body. They ^{appear to be} ~~are~~ removed only in consequence of the action of the lymphatics upon them.

Mr Hunter has remarked that in infancy the cavity of the thigh bone is remarkably small. As the child advances in age, this cavity becomes larger - Thus while the arteries add bony matter to the external, the lymphatics ~~consume~~ consume & absorb the internal part of the ~~bone~~ bone. In this manner - it is probable the ^{solids} ~~bone~~ are constantly undergoing a renovation in a greater or less degree, more especially in the early part of life. ✓

But we have not yet done with the offices of the lymphatics. They

~~I have said ^{the Lymphatics absorb} Absorption takes place~~
~~from internal parts of the body, but~~
~~it has long been believed that they~~
~~absorb likewise from the surface of the~~
~~body, and ~~water & lymph~~ system of~~
~~many practical inductions in~~
~~pathology and the practice of physic~~
~~have been made from it. =~~

